



405615



Fw: 515 Peshtigo - Options for Radiological Disposal
VERNETA SIMON to: Mark Bedford
 Cc: Mary Fulghum, Cathleen Martwick

09/13/2011 08:17 AM

Here's the 11(e)(2) message. Please check w/Mary about how to insert into the Administrative Record , etc.

----- Forwarded by VERNETA SIMON/R5/USEPA/US on 09/13/2011 08:16 AM -----

From: VERNETA SIMON/R5/USEPA/US
 To: "Kornder, Steve" <Steve.Kornder@aeom.com>
 Cc: "Biernacki, Donald" <dbiernacki@relatedmidwest.com>, "Dombrowski, Leo" <Dombrowski@wildman.com>, "Koch, Larry" <lkoch@relatedmidwest.com>, "Petrucione, John" <John.Petrucione@aeom.com>, EUGENE JABLONOWSKI/R5/USEPA/US@EPA, Cathleen Martwick/R5/USEPA/US@EPA, Mary Fulghum/R5/USEPA/US@EPA
 Date: 09/07/2011 02:35 PM
 Subject: 515 Peshtigo - Options for Radiological Disposal

Good Afternoon Steve:

This e-mail responds to your inquiry regarding shipping Lindsay Light thorium -contaminated waste to US Ecology. I believe in recent discussions between you and Gene Jablonowski , Superfund Health Physicist, it was explained that the State of Illinois , under its Nuclear Regulatory Commission Agreement State authority, per the October 1995 and June 1996 letters below, classified the Lindsay Light thorium-contaminated material and identified applicable and relevant and appropriate regulations (ARARS) governing its management and disposal. Consequently, EPA requires that the Lindsay Light thorium-contaminated material be disposed in accordance with the State of Illinois classification , specifically 11(e)2 byproduct. If there are alternative disposal sites to Energy Solutions that can accept the material as currently classified by the State of Illinois Emergency Management Agency Division of Nuclear Safety then such disposal site(s) is/are acceptable alternatives. If you believe the State of Illinois should classify the Lindsay Light thorium contaminated material differently then you should request Illinois to reclassify the material and adjust the ARARs and identify appropriate alternative disposal sites accordingly.



KM to IDNS reclass 11e2 25Aug1995.PDF



IDNS to EPA 11e2 04Jun1996.PDF



IDNS to KM 11e2 25Oct1995.PDF



IDNS to STS rad H2O 4Dec1994.PDF

From: "Kornder, Steve" <Steve.Kornder@aeom.com>
 To: VERNETA SIMON/R5/USEPA/US@EPA, EUGENE JABLONOWSKI/R5/USEPA/US@EPA, Cathleen Martwick/R5/USEPA/US@EPA, Mary Fulghum/R5/USEPA/US@EPA
 Cc: "Biernacki, Donald" <dbiernacki@relatedmidwest.com>, "Dombrowski, Leo" <Dombrowski@wildman.com>, "Koch, Larry" <lkoch@relatedmidwest.com>, "Petrucione, John" <John.Petrucione@aeom.com>
 Date: 09/07/2011 10:26 AM
 Subject: 515 Peshtigo - Options for Radiological Disposal

Good Morning Verneta:

Per our discussion late last week, I am forwarding this email to the Agency to verify that disposal sites

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12/20/94 11:00 2878042

STS CONSULTANTS

001/004



STS Consultants Ltd.
Consulting Engineers

1415 Lake Cook Road
Deerfield, IL 60015
(708) 272-6520

EPA Region 5 Records Ctr.



227131

E-1
12/94

DATE:

12/94

FAX TRANSMITTAL COVER SHEET

PLEASE DELIVER THE FOLLOWING PAGES IMMEDIATELY TO:

NAME: VERNITA SIMON

COMPANY: USEPA

FAX NUMBER: (312) 353-9176

FROM:

NAME: STEVE NEWLIN

FAX NUMBER: (708) 498-2721 OR _____

TOTAL NUMBER OF PAGES (INCLUDING THIS COVER SHEET): 4

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MESSAGE: _____

ATTACHED IS THE CERTIFICATION
FOR THE WASTE WATER @ THE
LINDSAY LIGHT II SITE

IF YOU DO NOT RECEIVE ALL PAGES, PLEASE CALL (708) 272-6520.

US0846694

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12/20/84 11:00 2878042

STS CONSULTANTS

002/004

FROM: DEPT. NUCLEAR SAFETY

TO: 4982721 2678048

DEC 6, 1994 4:35PM #017 P.01

STATE OF ILLINOIS
DEPARTMENT OF NUCLEAR SAFETY
1035 OUTER PARK DRIVE
SPRINGFIELD, ILLINOIS 62704

Jim Edgar
Governor

Thomas W. Ortziger
Director

December 6, 1994

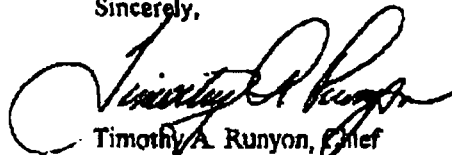
Mr. Richard Berggreen
STS Consultants Ltd.
1415 Lake Cook Road
Deerfield, Illinois 60015

Dear Mr. Berggreen:

This letter is in response to correspondence from your office dated November 17, 1994 regarding disposal of waste water generated during your company's characterization of Thorium 232 contamination at 316 E. Illinois St. in Chicago, Illinois. Review of the MJW Corporations analytical results for samples of the waste water indicate gross alpha/beta activity to be at or below the minimum detectable activity (4.1 E-09 uCi/ml) for the counting system used. Although the water was not generated as part of an activity licensed by the Illinois Department of Nuclear Safety, analytical results confirm that the activity in the subject sample is well below the average monthly limit of 3.0 E-08 uCi/ml available for release to any sanitary sewer.

Based on the above information we concur that the water may be free released in any manner consistent with typical clean waste water disposal practices and the goals of the project. If you have questions regarding this correspondence please feel free to call me at (217) 786-6365.

Sincerely,



Timothy A. Runyon, Chief
Division of Environmental Monitoring

cc: Richard Allen, OES
Vernita Simon, USEPA

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12/20/84 11:01 2878042

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003/004

FROM: DEPT. NUCLEAR SAFETY

TO: 4982721 2678848

DEC 6, 1994 4:37PM #017 P.02

84340.960 - 1030

- 3) Monitor all packages known to contain radioactive material for radioactive contamination and radiation levels if there is evidence of degradation of package integrity, such as packages that are crushed, wet or damaged.
- c) The licensee shall perform the monitoring required by subsection (b) above as soon as practicable after receipt of the package, but not later than 3 hours after the package is received at the licensee's facility if it is received during the licensee's normal working hours or if there is evidence of degradation of package integrity, such as a package that is crushed, wet or damaged. If a package is received after working hours, and has no evidence of degradation of package integrity, the package shall be monitored no later than 3 hours from the beginning of the next working day.
- d) The licensee shall immediately notify the final delivery carrier and the Department, by telephone and either telegram, mailgram or facsimile, when:
 - 1) Removable radioactive surface contamination exceeds the limits of 32 Ill. Adm. Code 341.150(h); or
 - 2) External radiation levels exceed the limits of 32 Ill. Adm. Code 341.150(i) and (j).
- e) Each licensee shall:
 - 1) Establish, maintain and retain written procedures for safely opening packages in which radioactive material is received; and
 - 2) Ensure that the procedures are followed and that special instructions for the type of package being opened are adhered to.

SUBPART K: WASTE DISPOSAL

Section 340.1010 General Requirements

- a) A licensee shall dispose of licensed material only:
 - 1) By transfer to an authorized recipient as provided in Section 340.1060 or in 32 Ill. Adm. Code 330, 332 or 601, or to the U.S. Department of Energy; or
 - 2) By release in effluents within the limits in Section 340.310; or
 - 3) As authorized pursuant to Sections 340.1020, 340.1030, 340.1040 or 340.1050.
- b) A person shall be specifically licensed by the Department prior to receiving waste containing licensed material from any other point of generation for:
 - 1) Treatment prior to disposal; or
 - 2) Treatment or disposal by incineration; or
 - 3) Disposal at a land disposal facility licensed pursuant to 32 Ill. Adm. Code 601; or
 - 4) Storage until transferred to a disposal facility authorized to receive the waste.

Section 340.1020 Method for Obtaining Approval of Proposed Disposal Procedures

A licensee or applicant for a license may apply to the Department for approval of proposed procedures, not otherwise authorized in 32 Ill. Adm. Code: Chapter II, Subchapters b and d, to dispose of licensed material generated in the licensee's operations. Each application shall include:

- a) A description of the waste containing licensed material to be disposed of, including the physical and chemical properties that have an impact on risk evaluation, and the proposed manner and conditions of waste disposal;
- b) An analysis and evaluation of pertinent information on the nature of the environment;
- c) The nature and location of other potentially affected facilities; and
- d) Analyses and procedures to ensure that doses are maintained ALARA and within the dose limits in this Part.

Section 340.1030 Disposal by Release into Sanitary Sewerage

- a) A licensee may discharge licensed material into sanitary sewerage if each of the following conditions is satisfied:
 - 1) The material is readily soluble, or is readily dispersible biological material, in water;
 - 2) The quantity of licensed radioactive material that the licensee releases into the sewer in 1 month divided by the average monthly volume of water released into the sewer by the licensee does not exceed the concentration listed in Table 3 of Appendix B to 10 CFR 20.1001 - 20.2401, effective January 1, 1994, exclusive of subsequent amendments or editions;
 - 3) If more than one radionuclide is released, the following conditions must also be satisfied:
 - A) The licensee shall determine the fraction of the limit in Table 3 of Appendix B to 10 CFR 20.1001 - 20.2401, effective January 1, 1994, exclusive of subsequent amendments or editions, represented by discharges into sanitary sewerage by dividing the actual monthly average concentration of each radionuclide released by the licensee into the sewer by the concentration of that radionuclide listed in Table 3 of Appendix B to 10 CFR 20.1001 - 20.2401, effective January 1, 1994, exclusive of subsequent amendments or editions; and
 - B) The sum of the fractions for each radionuclide required by subsection (a)(3)(A) above does not exceed unity;

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12/20/94 11:02 2678042

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004/004

FROM: DEPT. NUCLEAR SAFETY

TO: 4982721 2678040

DEC 6, 1994 4:37PM 0017 P.23

23454 Federal Register / Vol. 66, No. 98 / Tuesday, May 31, 1991 / Rules and Regulations

Atomic No.	Radioisotope	Class	Table 1 Occupational Values			Table 2 Effluent Concentrations		Table 3 Release to Biota
			Col. 1 Oral Intake (μCi)	Col. 2 Inhalation (μCi)		Col. 1 Air ($\mu\text{Ci}/\text{m}^3$)	Col. 2 Water ($\mu\text{Ci}/\text{m}^3$)	Monthly Average Concentrations ($\mu\text{Ci}/\text{m}^3$)
				Col. 1 All (μCi)	Col. 2 Respiratory ($\mu\text{Ci}/\text{m}^3$)			
81	Actinium-226	D, see 224Ac	2E+3	2E+0 Same surf (2E+1)	2E+9	-	2E+5	2E+4
		M, see 224Ac	-	2E+1 Same surf (2E+1)	2E+8	2E+11	-	-
		V, see 224Ac	-	2E+1 Same surf (2E+1)	2E+8	2E+11	-	-
90	Thorium-228	M, all compounds except those given for Y	2E+3 2E+1 (2E+0)	2E+2	2E+8	2E+10	-	-
		V, oxides and hydroxides	-	2E+0	2E+8	2E+10	-	-
90	Thorium-227	M, see 226Th	2E+3	2E+1	2E+10	2E+13	2E+6	2E+6
		V, see 226Th	-	2E+1	2E+10	2E+13	-	-
90	Thorium-226	M, see 226Th	2E+3 Same surf (2E+1)	2E+2 Same surf (2E+2)	2E+12	-	-	-
		V, see 226Th	-	2E+2	2E+12	2E+14	2E+7	2E+6
90	Thorium-229	M, see 226Th	2E+3 Same surf (2E+0)	2E+2 Same surf (2E+0)	2E+12	-	-	-
		V, see 226Th	-	2E+2 Same surf (2E+0)	2E+12	2E+14	2E+7	2E+6
90	Thorium-230	M, see 226Th	2E+3 Same surf (2E+0)	2E+2 Same surf (2E+0)	2E+12	-	-	-
		V, see 226Th	-	2E+2 Same surf (2E+0)	2E+12	2E+14	2E+7	2E+6
90	Thorium-231	M, see 226Th	2E+3	2E+2	2E+12	2E+14	2E+7	2E+6
		V, see 226Th	-	2E+2	2E+12	2E+14	2E+7	2E+6
90	Thorium-232	M, see 226Th	2E+3 Same surf (2E+0)	2E+2 Same surf (2E+0)	2E+12	-	-	-
		V, see 226Th	-	2E+2 Same surf (2E+0)	2E+12	2E+14	2E+7	2E+6
90	Thorium-234	M, see 226Th	2E+3 2E+1 (2E+0)	2E+2	2E+8	2E+10	-	-
		V, see 226Th	-	2E+2	2E+8	2E+10	2E+6	2E+5
91	Protactinium-227	M, all compounds except those given for Y	2E+3	2E+2	2E+8	2E+10	2E+6	2E+6
		V, oxides and hydroxides	-	2E+0	2E+8	2E+10	-	-
91	Protactinium-229	M, see 227Pa	2E+3	2E+1 Same surf (2E+1)	2E+8	-	2E+5	2E+4
		V, see 226Pa	-	2E+1	2E+8	2E+11	-	-

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KERR-MCGEE CHEMICAL CORPORATION

KERR-MCGEE CENTER • OKLAHOMA CITY, OKLAHOMA 73125

August 25, 1995

EPA Region 5 Records Ctr.



226980

Mr. Joseph G. Klinger
Head, Licensing Section
Division of Radioactive Materials
Department of Nuclear Safety
1035 Outer Park Drive
Springfield IL 62704

Subject: Classification of Radioactive
Material at Lindsay Light II

Dear Mr. Klinger:

Kerr-McGee Chemical Corporation (KMCC) wishes to inform the Illinois Department of Nuclear Safety (IDNS) that additional information has been obtained which we believe supports reclassification of the materials associated with the Lindsay Light II site located at 316 East Illinois Street in Chicago, Illinois from "source" material to 11(e)2 "by-product" material.

The IDNS, in a letter dated August 27, 1993, to Mr. Rick Karl at Region 5 of the U.S. Environmental Protection Agency (EPA), recommended that the material at the 316 East Illinois location be classified as "source" material. In this letter the IDNS stated (1) that this classification was based on careful review of very limited information available at that time and (2) that the IDNS would inform the EPA if further information was obtained which altered this recommendation.

On December 9, 1993, Region 5 of the EPA, under Section 104(e) of CERCLA, requested KMCC to provide information concerning the Lindsay Light II site. In order to reply to this request, KMCC reviewed Lindsay Light Company records including board meeting minutes. This review has led us to the conclusion that a monazite processing operation was located on the Lindsay Light II site. Some excerpts and specific notations from Lindsay's meeting minutes (copies enclosed) follow:

- a. September 8, 1914
The Board resolves to rent the building at 316-322 East Illinois Street from Chicago Dock & Canal Trust for manufacturing purposes for the period 1/1/15 through 4/30/20.

US0845111

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Mr. Joseph G. Klinger

August 25, 1995

Page 2

- b. September 9, 1922
The Chairman tells the board that the lease on the "monazite refinery" on Illinois Street expires on 4/30/23. (No minutes could be found which mentioned the renewal of the lease on the 316 East Illinois Street building after the original expiration date of 4/30/20).
- c. March 9, 1923
The Board resolved to renew the lease for the "chemical plant" at 316 E. Illinois Street for another year, through 4/30/24.
- d. March 18, 1924
The Board resolved to extend the lease on the "monazite plant" for another two years, through 4/30/26. (Presumed to be the building at 316 East Illinois Street, based on the expiration time for the previous lease and the fact that Lindsay "owned" the gas mantle plant and office facility at 161 East Grand Avenue).
- e. November 24, 1925
C. R. Lindsay, in a written report to the Board, discussed obtaining a contract for a by-product from Lindsay's Monazite Sand. He stated, "This will enable us to keep our Refinery going from now on at 100% increase in capacity for a year and a half. I therefore renewed our lease on the Illinois Street property for one year to May 1, 1927."
- f. July 18, 1929
"The question of securing a new lease for the Chemical Plant after the present one runs out which expires May 1931 was brought up by Mr. Lindsay, Jr., and thoroughly discussed by the Directors. It was finally moved by Mr. Beste, seconded by Mr. Stabenau, and unanimously passed that a new lease be secured not to exceed two years in duration."
- g. December 22, 1931
The Board discussed how to balance production between the West Chicago and Illinois Street plants. (They agreed to phase out production at the Illinois Street plant by transferring physical equipment to West Chicago).

Although some Board Meeting Notes were missing in the documents obtained from Chicago Dock & Canal Trust, KMCC feels that those summarized above and enclosed herewith provide sufficient proof that 316 E. Illinois Street housed Lindsay's monazite refinery. KMCC therefore requests that the IDNS reclassify the associated material from "source" to 11(e)2 "by-product" material and inform Region 5 of the EPA of this change.

Confidential

Mr. Joseph G. Klinger

August 25, 1995

Page 3

Please direct any questions concerning this request to me by calling (405) 270-2671 or by writing to me at the above address.

Very truly yours,

A handwritten signature in black ink, appearing to read "R. A. Thompson". The signature is fluid and cursive, with the first name "R." and last name "Thompson" clearly distinguishable.

R. A. Thompson
Project Manager

Enclosures

cc: C. R. Gardner, Chicago Dock & Canal Trust
R. A. Meserve, Covington & Burling
V. Simon, OSC, U.S. EPA
W. O. Green
M. S. Krippel
J. D. White
File CD 1.4-3

Confidential

The regular meeting of BOARD OF DIRECTORS held in the office of Lindsay Light Company, 161 East Grand Avenue, Chicago, Illinois, September 8th, 1914, four P. M.

There were present:

Chas. R. Lindsay, Jr.
George P. Gilman,
Jos. M. Sherburne

Same being a majority of the directors of Lindsay Light Company.

Chas. R. Lindsay, Jr. in the chair.

The following resolution was adopted:

Resolved that Lindsay Light Company rent building #316 to #322 Illinois Street, Chicago, for manufacturing purposes necessary to this business for a period of five years and four months beginning from January 1st, 1915 to April 30th, 1920 at \$150.00 a month, this building to be rented from The Chicago & Canal Company as per their lease September 3rd, 1914.

There being no further business before the meeting, it was adjourned.


SECRETARY.

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JOS. M. SHERBURNE, PRESIDENT.
HERBERT N. MCCOY, VICE PRES.
OTTO N. BERNOT, SECY. & TREAS.

Lindsay Light Company

Chicago

September 9, 1922.

To the Stockholders of

Lindsay Light Company:

Enclosed herewith is a formal notice and blank proxy relative to the special meeting of our stockholders to be held on September 20th, 1922.

Your Directors feel that an explanation is proper at this time as to the reason why it is desired to increase our capital stock.

The real estate and buildings carried on our books at \$146,955.78, have recently been appraised and show a replacement value of over \$200,000.00. The Directors and the Officers of this Company have realized that this property which they now occupy is far too valuable for manufacturing gas mantles. The lease on the monazite refinery which we occupy on Illinois Street expires April 30th, 1923. *

We all feel that the time has now arrived when arrangements should be made to get into a location where the entire operations of this business might be concentrated and operated with greater economy. It would seem to us unwise to go into new property with the investment that would be required if it were possible to take over a property engaged in this kind of business adapted to our needs.

Because of the above reasons we have concluded that our interests would be best served by completing negotiations which have been carried on for some time. This \$200,000.00 increase in Preferred Capital Stock of this Company is to be used toward acquiring the manufacturing property of the Block Gas Mantle Company of Youngstown, Ohio, if the deal, as now planned, can be consummated, which consists of approximately three acres of land, exceedingly well located for shipping facilities, etc. Of course, if for any reason the deal cannot be consummated as now planned, the capital stock will not be increased or the stock will not be issued at this time.

Your Officers and Directors have investigated the value of the property to be acquired very carefully and are of the opinion that it is reasonably worth considerably in excess of the par value of the Lindsay Preferred Stock to be issued in exchange therefor.

We believe it is an economic move of considerable value and will tend to increase the earnings and the value of the stock of the Lindsay Light Company.

For the reasons above stated your Directors and Officers believe this move an exceedingly wise one and we hope that you will send in your proxy at once.

Yours very truly,

JOS. M. SHERBURNE,
President.

Confidential


Minutes of the Special Meeting of the Board of Directors of the Lindsay Light Company held in lieu of the February regular meeting on March 9, 1923, at the Old Colony Club at the hour of 1:00 p.m.

The meeting was called to order by Mr. Jos. M. Sherburne, the President of the Company, who acted as Chairman of the meeting, and the Secretary of the Company, Mr. Otto H. Berndt, acted as Secretary of the meeting.

Five of the Directors were present, namely:-

Mr. Jos. M. Sherburne
Mr. H. N. McCoy
Mr. O. N. Berndt
Mr. R. E. Wilsey
Mr. H. C. Beste

Same being five Directors of the Lindsay Light Company, thereby constituting a quorum.

The first order of business was the taking up of the renewal of leases. Upon motion duly made by H. N. McCoy, seconded by H. C. Beste, and unanimously approved, it was decided to renew our lease for our chemical plant at 316 E. Illinois St., for the same terms and conditions at the same rental for another year, which will make our term of occupancy expire April 30, 1924. 

Thereupon motion duly made by Mr. R. E. Wilsey, seconded by H. N. McCoy, and unanimously approved, it was decided to renew the lease of our New York office at 91 Chambers Street, for a period of one year at a rental of \$3500 per year. It was pointed out by the President that inasmuch as the New York office had sub-leased a loft at an annual rental of \$900 and as the rental mentioned above showed a saving of \$500 over the previous rental, the total net saving to the New York Department amounts to \$1400, making the net cost for rental of our New York office \$2600 annually.

Thereupon ensued a discussion upon the Thorium contracts which Mr. Sherburne has been negotiating with The Coleman Lamp Company, of Wicks, and The Block Gas Mantle Company, of Youngstown. It was regularly moved by Mr. R. E. Wilsey, seconded by H. C. Beste, and unanimously approved by all present, that the contracts as tentatively made by Mr. Sherburne were fully approved and authorized.

Mr. Sherburne thereupon brought up the subject matter of the Monasite Sand contracts with the Travancore Minerals Company, London, and after a very thorough comprehensive discussion of same, it was deemed advisable to postpone any definite decision on this subject matter until the regular March meeting of the Board of Directors.

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Thereupon, Mr. Sherburne read the following proposal from Mr. C. R. Lindsay to purchase our building at 161 E. Grand Ave.:

"I will buy the building and real estate located at 161 E. Grand Ave., Chicago, owned by Lindsay Light Company for \$275,000.00, payable in Lindsay Light 7% preferred stock at par, and if the Company desires to lease same from me, will make a one, three, or five year lease at \$15,000 per year, they to assume all taxes, insurance, and repairs to building. If this is favorable to the Directors and legal, it can be acted on at once, but if lawyers think it should be submitted to a vote of the stockholders, it would be satisfactory to me."

After a thorough discussion of the matter, it was suggested that no decision be reached until the regular March meeting.

Thereupon motion duly made by Mr. R. E. Wilsey, seconded by H. N. McCoy, and unanimously approved, it was decided to withdraw our building at 161 E. Grand Ave., from sale. The officers were likewise authorized to vacate any floor and make diligent effort to rent same under the most favorable rental prices obtainable, if the manufacturing operations could be so arranged.

Oth N. Berner
SECRETARY.

We, the undersigned, being Directors of the Lindsay Light Company, and having been present at the meeting of said Directors held on March 9, 1923, hereby certify that the foregoing record thereof is a true record and that we consent thereto.

John H. Berner
Oth N. Berner
H. N. McCoy
A. C. Bush

We concur in the foregoing and ratify and approve the said records and the proceedings described therein.

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MARCH MEETING

MINUTES OF THE REGULAR MEETING OF THE BOARD
OF DIRECTORS OF THE LINDSAY LIGHT COMPANY
HELD AT THE OFFICE OF SAID COMPANY, 161 EAST
GRAND AVENUE, CHICAGO, ILLINOIS, ON TUES-
DAY, MARCH 18, 1924, AT THE HOUR OF 3 P. M.

Mr. Jos. M. Sherburne, President of the Company,
presided over the Meeting, and the Secretary of the Company,
Mr. Otto H. Berndt, acted as Secretary of the Meeting.

The following five Directors were present, viz:

Chas. R. Lindsay, Jr.
Jos. M. Sherburne
H. H. McGoy
Otto H. Berndt
Harry C. Beste

Same being five Directors of the Lindsay Light Com-
pany, thereby constituting a quorum.

As the first order of business, Mr. Sherburne re-
ported that we had paid all of our loans with the Central
Trust Company of Illinois and had taken out with the First
National Bank of Chicago, \$100,000.00 on demand notes and
\$50,000.00 on two four-month time notes. The Central Trust
Company returned Mr. Lindsay's personal guarantee on March
18, 1924, thereby relieving him from further financial re-
sponsibility.

Mr. Sherburne, thereupon, reported that we had made
payment to the Travancore Minerals Company on account of
penalty on Sand Contract. The first installment of one hun-
dred tons on the new Sand Contract has been shipped and is
now enroute.

It was likewise reported that a two-year lease on
the Monasite Plant, at the same rate, had been signed by the
officers. *

Thereupon ensued a general discussion regarding
our future policy with reference to the sale of all electrical
fixtures.

There being no further business before the meeting,
the same, on motion duly made and carried, was declared ad-
journed.

Otto H. Berndt
SECRETARY

Confidential

- 2 -

We, the undersigned, being Directors of the Lindsay Light Company, and having been present at the meeting of said Directors held on March 18th, 1924, hereby certify that the foregoing record thereof is a true record and that we consent thereto.

Wm. J. Perkins
Herbert H. McCoy
Otto M. Benck
Chas. Lindsay

We concur in the foregoing and
ratify and approve the said
records and the proceedings de-
scribed therein.

Confidential

NOVEMBER MEETING

MINUTES OF THE REGULAR MEETING OF THE BOARD
OF DIRECTORS OF LINDSAY LIGHT COMPANY, DULY
CALLED AND HELD IN ITS OFFICE, 161 E. GRAND
AVENUE, CHICAGO, ILLINOIS, ON TUESDAY
NOVEMBER THE 24TH, 1925, AT THE HOUR OF 3 P.M.

There were five Directors present, viz:

C. R. Lindsay, Jr.
J. M. Sherburne
H. N. McCoy
H. C. Beste
C. R. Lindsay III

Same being five of the Directors of the Lindsay
Light Company, thereby constituting a quorum.

Mr. C. R. Lindsay, Jr. acted as Chairman and
Mr. C. R. Lindsay III as Secretary of the meeting.

Minutes of the September meeting were approved.

As the first order of business, Mr. C. R. Lindsay, Jr. brought up the name of Mr. Frederick J. Clifford to serve as a Director to fill the unexpired term of the late Otto N. Berndt. Mr. Sherburne nominated Mr. Clifford for this position and Mr. McCoy seconded this. Mr. Clifford was then unanimously elected by the Directors and the Secretary was instructed to notify him accordingly of this action.

The Chairman then proceeded to read a report to the meeting of his work, since August the 1st, while in charge of the Company's affairs. This reads as follows:

Confidential

- 2 -

November 24, 1925

- TO THE DIRECTORS OF LINDSAY LIGHT CO. -

Our regular October Meeting was omitted, as I was in New York at the time, but I sent each of you a statement showing our net worth as of September 30, 1925 to be \$334,788.34, after charging off for depreciation, bad debts, etc. \$77,532.18. For that Quarter our operating loss was \$6,039.89, which compares with \$16,778.58 for the corresponding quarter last year. Both of these losses are figured before depreciation, etc.

On my arrival in Chicago, July 26, I found instead of our business showing improvement, it showed an increase in losses; that our Second Quarter showed a loss of \$20,978.58 before deducting for depreciation, etc. This was the worst loss in any quarter we have had for years, so I decided to remain in Chicago and was put in charge of the business by the Directors at the July 28 meeting, until the annual meeting, January 1926, at which time the Directors for 1926 will be elected by the stockholders, and the Directors will then, in turn, elect the Officers.

During these four months radical changes have been made, overhead being reduced over \$60,000.00 annually, prices advanced on merchandise which showed little or no profit, residential electric line, of which we had an enormous stock, and which was and is one of the main causes for our losses, (thousands of dollars of which have been returned to us in the past few months and thousands of dollars worth of which we have disposed of at less than \$0.25 on the dollar) is being cut down to a small line of profitable merchandise most of which we shall manufacture ourselves, our New York Department has been turned into an office in place of an expensive branch, and when our present lease expires April 30, we will move into less expensive quarters.

Bankruptcy surely would have followed if these radical changes had not been made, and today I am pleased to report we owe the bank \$45,000.00 compared to \$90,000.00 last July and have a fair deposit in the bank instead of a continued overdraft as then.

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Our gas mantle business is comparatively good, manufacturing and selling about thirteen thousand (13,000) per day, which is about the same amount compared with the same period last year.

We have very little electric business direct with dealers and Public Service Corporations, but our business with Western Electric Company shows an increase, for the first ten months of this year, of 60%, compared with the same period last year and would show higher were it not for the residential electric fixtures which we were obliged to take back.

In chemicals we were fortunate in closing a contract with National Carbon Company for a by-product from our Monazite Sand, delivery to start March 1, 1926 at a 23% higher price. This will enable us to keep our Refinery going from now on at 100% increase in capacity for a year and a half. I, therefore, renewed our lease on the Illinois Street property for one year to May 1, 1927.

Our gross business during the past four months shows but 10% increase for the corresponding four months last year, and 40% of our total business is through Western Electric Company. The reasons our gross business has not proved more are that last year we sold more Thorium and considerably more in sundries, but what we are doing today is seven less salesmen. We have at present but five men selling. While our business with Western Electric Company is not so large as we had been led to expect, still, it shows a good continued increase.

I believe we are now making money for the first time in years and that this, our last quarter, will show a profit after charging off depreciation, etc., unless we reduce our inventory on the present stock of Thorium from \$2.50 per pound old cost to about \$2.02 per pound present cost, which is on account of making double the quantity of the Rare Earths, which we supply National Carbon Company; but even at the new cost of \$2.02 we figure the entire cost of the sand into the Thorium. If we make this depreciation of \$0.48 per pound, it will amount to about \$11,000.00. I recommend that this be done.

I have nothing of further importance to bring up at this meeting, so if there are any questions or suggestions

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to offer, I would be pleased to hear them. I might add that we will, in a short time, have to get out our proxies for the annual meeting and decide amongst ourselves as to the Directors and Officers for next year, so it is up to you as to whether it should be done at this meeting or regular December Meeting.

A handwritten signature in cursive script, appearing to read "Charles R. Lindsay".

Chairman - Board of Directors

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This report as submitted was given the full approval of the Directors.

The Chairman then suggested the advisability of cutting down the inventory value of Thorium in stock from \$2.50 per pound to \$2.02 per pound, based upon new cost of production data recently obtained. This cut he suggested as being effective in the next inventory of December 31st. Mr. Sherburne accordingly made the motion to lower inventory price of Thorium to present revised cost, figured on basis of 250% overhead, with the understanding that the actual figure would be definitely decided upon at the next meeting. Mr. Beste seconded this motion and was passed unanimously.

The Chairman then announced that he had received information that the Company would be able to secure about \$4,000.00 refund from the Government on 1918 taxes. He further stated that under a new court ruling, the Company might recover 1919 and 1920 tax refunds in addition. This ruling was to the effect "that invested capital cannot be reduced by taxes paid in previous years".

The Chairman then explained to the Directors that due to the recent failure of Gaites, Peace Company, Lindsay Light Company had definitely made arrangements to manufacture certain staple residential fixtures. He believed that by so doing, cost could be reduced very materially.

The Chairman brought up again the suggestion that the Company buy in on the open market a certain amount of its Preferred Stock. It was decided to defer decision on this until a later meeting.

There being no further business, the meeting was adjourned.

Chas. R. Lindsay
SECRETARY.

Confidential

- 5 -

We, the undersigned, being Directors of the Lindsay Light Company, and having been present at the meeting of said Directors held on November 24th, 1925, hereby certify that the foregoing record hereof is a true record and we consent thereto.

Charles Lindsay

W. M. Lindsay

Chas. R. Lindsay

We concur in the foregoing and ratify and approve the said records and the proceedings described therein.

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JULY 1929 MEETING

MINUTES OF THE REGULAR MEETING OF THE BOARD OF
DIRECTORS OF LINDSAY LIGHT COMPANY, DULY
CALLED AND HELD IN ITS OFFICE, 161 EAST GRAND
AVENUE, CHICAGO, ILLINOIS, ON TUESDAY, JULY
THE 18TH, 1929, AT THE HOUR OF 3 P. M.

The meeting was called to order by Mr. Chas. R.
Lindsay, Jr., who acted as Chairman of the meeting, and Mr. Chas.
R. Lindsay, III, acted as Secretary of the meeting.

Present:

Mr. M. W. Richelberger
Mr. C. W. Stabenau
Mr. R. L. Little
Mr. H. C. Beste
Mr. C. R. Lindsay, Jr.
Mr. C. R. Lindsay, III.

Same being six of the Directors of Lindsay Light Com-
pany, thereby constituting a quorum.

Minutes of the previous meeting were approved.

As the first order of business, the list of repairs
to be made at the Chemical Refinery was checked over and Mr.
Little reported that everything agreed upon at the previous
meeting had been taken care of.

Mr. Lindsay, Jr., then advised the Directors that we
were negotiating with the Welsbach Company with a view of ex-
changing Thorium Nitrate for Brazilian Monazite Sand and if the
right basis of exchange could be agreed upon, we would use
Brazilian Sand in the future instead of Indian Sand. He went
on to say that the very fact that the Thorium content was lower
in Brazilian Sand would be advantageous because at the same
time the Rare Earth Oxide content was equal or possibly greater
than contained in the Indian Sand.

Mr. Lindsay, Jr., submitted a statement for the six
months ending June 29, 1929, showing net earnings after
Federal Tax of \$38,443.72 against \$21,547.64 for the same
period of 1928. The statement was discussed by the Directors
and unanimously approved. Mr. Lindsay, Jr., went on to say
that these earnings were particularly gratifying, considering
the fact that we spent on repairs at the Chemical Refinery
this year approximately thirteen thousand dollars as against
six hundred dollars during the first six months of last year,

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and that he did not anticipate that anywhere near this amount would have to be expended the last half of this year.

The question of securing a new lease for the Chemical Plant after the present one runs out which expires May 1931 was brought up by Mr. Lindsay, Jr., and thoroughly discussed by the Directors. It was finally moved by Mr. Beste, seconded by Mr. Stabenau, and unanimously passed that a new lease be secured not to exceed two years in duration.

On motion by Mr. Eichelberger, seconded by Mr. Beste, and passed unanimously, the Company was authorized to purchase Preferred Stock at \$10.00 per share. It was stipulated, however, that this authority could be rescinded at any time by the Directors.

There being no further business before the meeting, the same was declared adjourned.

Chas. R. Lindsay Jr.
SECRETARY

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- 3 -

We, the undersigned, being Directors of Lindsay Light Company and having been present at the meeting of said Directors held on July 18th, 1929, hereby certify that the foregoing record hereof is a true record and we consent thereto.

Chas. R. Lindsay

C. W. Starkman

Robert Little

Max Weichelberger

Chas. R. Lindsay

I concur in the foregoing and ratify and approve the said records and the proceedings described therein.

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DECEMBER 1931 MEETING

MINUTES OF THE REGULAR MEETING OF THE BOARD
OF DIRECTORS OF LINDSAY LIGHT COMPANY,
DULY CALLED AND HELD AT WEST CHICAGO,
ILLINOIS, ON TUESDAY, DECEMBER THE 22ND,
1931, AT THE HOUR OF 4:30 P. M.

The meeting was called to order by Mr. Chas. R. Lindsay, Jr., who acted as Chairman of the meeting. Mr. Chas. R. Lindsay, III, acted as Secretary of the meeting.

Present:

Mr. H. N. McCoy
Mr. R. L. Little
Mr. C. W. Stabenau
Mr. M. W. Zichelberger
Mr. C. R. Lindsay, Jr.
Mr. C. R. Lindsay, III.

Same being six of the Directors of Lindsay Light Company, thereby constituting a quorum.

Minutes of the previous meeting were approved.

As the first order of business, the Directors held a lengthy discussion regarding the advisability of installing six additional pots in addition to the twelve there and running these concurrently with the twelve now in operation on Illinois Street. It was finally decided, owing to the fact that a great deal of duplication would be necessary in the machinery, to run twelve pots in each place until we had sufficient stock ahead; then to run eighteen pots in West Chicago and six on Illinois Street; and finally move the six out to West Chicago, making a total of twenty-four in that place which number of pots were estimated to amply take care of next year's requirements on the basis of contracts at hand. *

There being no further business before the meeting, the same was declared adjourned.

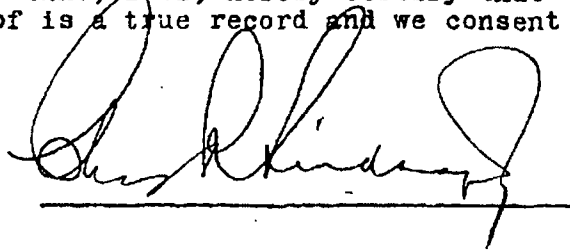
Chas. R. Lindsay, Jr.

SECRETARY

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- 2 -

We, the undersigned, being Directors of Lindsay Light Company and having been present at the meeting of said Directors held on December 22nd, 1931, hereby certify that the foregoing record hereof is a true record and we consent thereto.



C. W. Stabenau

Chas R. Lindsay

Robert L. Little

Mark Weichelt

I concur in the foregoing
and ratify and approve the
said records and proceedings
described therein.

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STATE OF ILLINOIS
DEPARTMENT OF NUCLEAR SAFETY
1035 OUTER PARK DRIVE
SPRINGFIELD, ILLINOIS 62704

000001

EPA Region 5 Records Ctr.



226336

Jim Edgar
Governor

217-785-9900
217-782-6133 (TDD)

Thomas W. Ortziger
Director

October 25, 1995

Mr. Richard A. Thompson
Project Manager
Kerr-McGee Chemical Corporation
Kerr-McGee Center
Oklahoma City, Oklahoma 73125

Re: Classification of Radioactive Material at Lindsay Light II

Dear Mr. Thompson:

We have carefully reviewed the information you submitted to us by letter of August 25, 1995, concerning the former use of the Lindsay Light II site located at 316 East Illinois Street in Chicago as a monazite processing facility. The minutes of meetings of the Directors of Lindsay Light Company provide ample evidence that monazite processing did in fact occur on the site.

On the basis of this new information, we agree that the radioactive material located at the site is byproduct material as defined in Section 11(e)2 of the Atomic Energy Act of 1954 (42 U.S.C. 2014). By copy of this letter, we are informing Region 5 of the U.S. Environmental Protection Agency that we conclude that the material should be reclassified as byproduct material.

If you have any questions, please contact me.

Sincerely,

for Steven C. Colling
Joseph G. Klinger
Head of Licensing Section
Division of Radioactive Materials

JGK:ren

cc: Region 5
U.S. Environmental Protection Agency

US0832401

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STATE OF ILLINOIS
DEPARTMENT OF NUCLEAR SAFETY
1035 OUTER PARK DRIVE
SPRINGFIELD, ILLINOIS 62704

000003

Jim Edgar
Governor

217-785-9900
217-782-6133 (TDD)

Thomas W. Ortiger
Director

EPA Region 5 Records Ctr.



226337

June 4, 1996

Ms. Verneta Simon
On-Scene Coordinator
U.S. EPA Region 5
77 West Jackson Boulevard
Chicago, IL 60604-3590

Dear Ms. Simon:

This is in response to your letter of June 2, 1996 relative to the identification of ARARs for the Lindsay Light II Site in Chicago. In August 1995, Kerr-McGee provided this Department additional information concerning the former use of the 316 East Illinois Street facility. Based on that information, our licensing staff determined that the radioactive material is byproduct material as defined in Section 11(e)2 of the Atomic Energy Act.

Given that the contaminant of concern is byproduct material, just like the West Chicago Residential Areas Superfund Site, we suggest that the list of ARARs used for that site would be appropriate for Lindsay Light II as well. That list of ARARs appears in the Final Criteria for Superfund Removal Actions at the Residential Areas Site. This is a November 19, 1993 memo from Regional Administrator Adamkus. A copy is attached for your reference.

Thank you for consulting with us in your development of ARARs.

Sincerely,

Richard Allen, Manager
Office of Environmental Safety

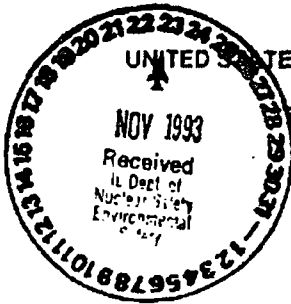
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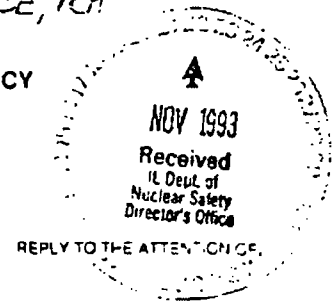
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DC: GA, SE, RII



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5
WEST JACKSON BOULEVARD
CHICAGO, IL 60604-3590




DATE: November 19, 1993

RE: U.S. EPA's Final Criteria for Superfund Removal Actions
at the Kerr-McGee Residential Areas Site, West Chicago,
Illinois

FROM: Valdas V. Adamkus
Regional Administrator

TO: Addressees

Please find attached a copy of the Final Criteria for Superfund Removal Actions at the Kerr-McGee Residential Areas Site. U.S. EPA will be conducting a public meeting on December 9, 1993, to present the final criteria to the general public. My staff will provide you with details on the public meeting in a separate mailing. If you have any questions concerning the criteria, please feel free to contact me or Rebecca Frey, Remedial Project Manager, at (312) 886-4760.


Valdas V. Adamkus

Addressees

Scott Palmer
Sen. Doris Karpel
Rep. Tom Johnson
Dave Engel
Don Foster
Joe Karaganis
Steven Lakics
Francis Lyons
Tom Ortogier
Dave Ed
Bill Seith
Ray Hansen



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**ACTION CRITERIA
FOR SUPERFUND REMOVAL ACTIONS
AT THE KERR-MCGEE RESIDENTIAL AREAS SITE
WEST CHICAGO, ILLINOIS**

**Prepared by
U.S. EPA Region 5**

November 1993

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ACTION CRITERIA FOR SUPERFUND REMOVAL ACTIONS AT THE KERR-MCGEE RESIDENTIAL AREAS SITE WEST CHICAGO, ILLINOIS

Introduction

Under the provisions of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (commonly known as Superfund), as amended by the Superfund Amendments and Reauthorization Act of 1986, the United States Environmental Protection Agency (U.S. EPA) is authorized, among other things, to take response actions whenever there is a release or threat of a release of a hazardous substance into the environment. The National Priorities List (NPL) is a list of hazardous waste sites across the country that are eligible for U.S. EPA response actions under Superfund.

The U.S. EPA has listed four sites in the vicinity of the City of West Chicago, Illinois, on the NPL. The primary contaminants of concern at these sites are radioactive thorium and its decay products derived from ore processing operations at a factory in West Chicago, now known as the Kerr-McGee Chemical Corporation West Chicago Rare Earths Facility ("factory site"). Three of the NPL sites became contaminated when the processing wastes (thorium mill tailings) were removed from the factory and used primarily as fill material in and around the City of West Chicago. These sites are known as:

- (1) Kerr-McGee (Residential Areas) site,
- (2) Kerr-McGee (Sewage Treatment Plant) site, and
- (3) Kerr-McGee (Reed-Keppler Park) site.

The fourth site became contaminated when discharges and runoff from the factory site traveled via a storm sewer into nearby Kress Creek and downstream to the West Branch of the DuPage River. This site is known as:

- (4) Kerr-McGee (Kress Creek/West Branch of DuPage River) site.

It is important to note that the Residential Areas site may encompass not only residential properties, but also institutional, commercial and municipal properties. Although primarily contaminated because thorium mill tailings were used as fill, some of the properties may have become contaminated due to windblown material from the factory site.

The Kerr-McGee factory site from which the contamination originated has not been listed on the NPL; it is regulated under the licensing authority of the Illinois Department of Nuclear Safety (IDNS). Decommissioning, clean-up and closure of the factory site currently is being addressed under that authority.

Purpose and Intent

The purpose of this document is to establish criteria for U.S. EPA's response actions at contaminated properties ("Residential Areas") that are not part of the Sewage Treatment Plant, Reed-Keppler Park or Kress Creek/West Branch of DuPage River sites. Those three NPL sites will be addressed by U.S. EPA in separate actions.

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It is the intent of the U.S. EPA to address the contamination problems at the Residential Areas by removal actions wherever practicable. Removal actions generally provide more immediate protection than do long-term remedial actions, and are consistent with the movement in the Superfund program to accelerate site cleanups.

U.S. EPA's actions under Superfund will be limited to those properties where the contamination is attributed to process wastes (thorium mill tailings) from the factory site. When naturally occurring radioactive materials not associated with process wastes cause U.S. EPA's action criteria to be exceeded, any corrective actions will have to take place through a separate mechanism, because Superfund generally does not give U.S. EPA the authority to remediate threats from naturally occurring substances.

This document contains the criteria that U.S. EPA will use to designate properties for removal actions and to verify that cleanup to levels protective of human health and the environment has been achieved. The U.S. EPA does not have standardized criteria for removal actions of this type. Consequently, site-specific criteria have been developed by the U.S. EPA in consultation with the IDNS for use at the Residential Areas. The criteria specified in this document will be used during three separate phases of the cleanup action: the discovery phase, the characterization phase, and the verification phase. Each of these phases and the criteria for each are described in detail later in this document. This document also contains release criteria for releasing equipment from work sites for unrestricted use.

Applicable or Relevant and Appropriate Requirements

Under Superfund, long-term remedial actions must attain Federal and more stringent State "applicable or relevant and appropriate requirements" (ARARs) during and at the completion of the remedial action. Removal actions (such as the type planned at the Residential Areas) must attain ARARs to the extent practicable. Therefore, U.S. EPA relied upon Federal and State ARARs to the extent practicable to establish the criteria in this document.

"Applicable requirements" are cleanup standards or other environmental protection requirements that specifically apply to the substances or activities at the site. In other words, an applicable requirement is one that a private party would have to comply with by law if the same action was being taken apart from Superfund authority.

If a requirement is not applicable, it still may be relevant and appropriate. "Relevant and appropriate requirements" are those cleanup standards that address problems or situations sufficiently similar to those at the Superfund site that their use is well suited to the particular site. A relevant and appropriate requirement must be both relevant to the conditions at the site and appropriate for use at the site, given the circumstances.

If a Federal or State requirement is neither applicable nor relevant and appropriate (and thus not an ARAR), it still may be useful to U.S. EPA when determining the necessary level of cleanup for protection of human health and the environment. Such "to-be-considered" material (TBCs) can include

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promulgated regulations that do not qualify as ARARs, and non-promulgated advisories or guidance issued by Federal or State government. Superfund actions are not required to meet TBCs.

Only requirements that are duly promulgated under Federal or State law can be ARARs. Additionally, only substantive requirements of regulations, not procedural requirements, can be ARARs for on-site actions.

The U.S. EPA has identified the following major sources of ARARs and TBCs for the cleanup actions at the Residential Areas:

Title 40, Part 192 of the Code of Federal Regulations (40 CFR 192), entitled "Health and Environmental Protection Standards for Uranium and Thorium Mill Tailings" - 40 CFR 192 contains U.S. EPA's standards for cleanup of lands contaminated by uranium and thorium mill wastes. The standards apply only to the sites specifically designated under the Uranium Mill Tailings Radiation Control Act of 1978, but they often have been used as criteria at uranium, thorium and radium sites because of the similarity of the problems. They are not applicable to the Residential Areas, but U.S. EPA considers portions to be relevant and appropriate.

Title 32, Chapter II, Subchapter b, Part 332 of the Illinois Administrative Code, entitled "Licensing Requirements for Source Material Milling Facilities" - These regulations deal with licensing requirements for source material milling facilities in Illinois and apply to the Kerr-McGee factory site in West Chicago. They are not applicable to the Residential Areas, but U.S. EPA considers portions to be relevant and appropriate and portions to be TBCs.

Title 32, Chapter II, Subchapter b, Part 340 of the Illinois Administrative Code, entitled "Standards for Protection Against Radiation" - These regulations establish standards for protection against radiation hazards, primarily in an occupational setting; they control the possession, use and transfer of sources of radiation by "licensees and registrants" so that the total dose to an individual does not exceed specified standards. They also contain decontamination guides for the release of equipment for unrestricted use. These regulations are not applicable to the Residential Areas, but U.S. EPA considers portions to be relevant and appropriate.

DOE Order 5400.5, entitled "Radiation Protection of the Public and the Environment" - This Order establishes standards and requirements for Department of Energy (DOE) operations with respect to protection of members of the public against undue risk from radiation, and contains a discussion of DOE's "ALARA" (As Low As Reasonably Achievable) approach. The Order is not a promulgated Federal or State regulation, and thus cannot be an ARAR, but U.S. EPA considers portions of the Order to be TBCs.

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Title 10, Part 20 of the Code of Federal Regulations (10 CFR 20), entitled "Standards for Protection Against Radiation" - These regulations contain the Nuclear Regulatory Commission's standards for protection against radiation, and contain an "ALARA" approach. They are not applicable or relevant and appropriate to the Residential Areas, but U.S. EPA considers portions to be TBCs.

U.S. Nuclear Regulatory Commission's Regulatory Guide 8.37 - This regulatory guide contains, among other things, a discussion of the NRC's "ALARA" approach. The regulatory guide is not a promulgated regulation, and thus cannot be an ARAR, but U.S. EPA considers a portion of the guide to be a TBC.

U.S. Nuclear Regulatory Commission's Regulatory Guide 1.86 - This regulatory guide contains, among other things, decontamination guides for the release of equipment for unrestricted use. The regulatory guide is not a promulgated regulation, and thus cannot be an ARAR, but U.S. EPA considers a portion of the guide to be a TBC.

The Action Criteria

The remainder of this document describes the different phases of the cleanup action, the specific Federal and State requirements that U.S. EPA considers to be ARARs or TBCs, and the resulting action criteria for each phase of the cleanup action.

DISCOVERY AND CHARACTERIZATION PHASES

The first phase of the cleanup action is the discovery phase. During this phase, properties in and around the City of West Chicago will be surveyed and sampled to discover and designate those that require cleanup. If a property clearly exceeds the discovery criteria, and if it is clear that the exceedance is due to thorium mill tailings from the factory site, the property will be designated for removal action. If it is not clear whether a property exceeds the discovery criteria (i.e., borderline results), or if it is not clear whether exceedance of the criteria is due to thorium mill tailings, then further investigation will be needed before a decision can be made to designate that property for response action. Such properties will move into the characterization phase.

Because the objective of both discovery and characterization is the same (i.e., to find contaminated properties), the action criteria during these two phases are identical. Properties deemed not to exceed the action criteria during either discovery or characterization will be excluded from further consideration.

Due to the nature of the radiological contamination at the Residential Areas, survey efforts during the discovery phase will consist of measuring and/or sampling the following four parameters: outdoor soil concentration, outdoor

gamma exposure rate, indoor gamma exposure rate and indoor radon/thoron air concentration.

The primary criterion that will be used to designate a property for response action is outdoor soil concentration. The other three parameters (outdoor gamma exposure rate, indoor gamma exposure rate and indoor radon/thoron air concentration) will be used as indicators or "finding tools" to help locate contaminated areas; elevated readings for any of these three parameters alone generally will not trigger a cleanup action unless combined with soil sampling data that exceeds the soil concentration criterion and confirms the presence of thorium mill tailings.

The U.S. EPA has taken a conservative approach with the discovery and characterization criteria in order to minimize the chances of not discovering properties where contamination actually is present. As a result, the discovery criteria may be more stringent than the verification criteria (e.g., for outdoor soil concentrations, the results will not be averaged over 100 square meters during discovery and characterization, but averaging over 100 m² may be conducted during the verification phase).

For indoor radon/thoron, the necessity for expeditious surveillance argues for measurements on a shorter time frame than the annual average (or equivalent) associated with the wording of the relevant and appropriate requirement. In order to not unduly delay assessments, discovery and characterization measurement periods may be on the order of 2 days to 3 months. Since weather, seasons and home usage all influence indoor radon/thoron levels, these shorter measurements may not fully characterize the annual average but should be adequate to serve as "finding tools." Also, many homes may have elevated levels of naturally occurring radon that are not associated with the presence of thorium mill tailings on the property. For these reasons, an elevated reading of indoor radon/thoron will not trigger a cleanup action unless combined with soil sampling data that exceeds the soil concentration criterion and confirms the presence of thorium mill tailings.

Discussed below are the criteria that will be used during the discovery and characterization phases of the response action:

• Outdoor Soil Concentration

Soil standards for mill tailings of the type present at the Residential Areas are found in 40 CFR 192, "Health and Environmental Protection Standards for Uranium and Thorium Mill Tailings," and at Section 332.150(b) of the Illinois Administrative Code. None of the standards are applicable to the Residential Areas, but portions are relevant and appropriate. Because the State standard is more stringent than the Federal standard (by specifying that the concentration limit is for dry soil), the State regulation is considered as the AAR.

The State regulation at Section 332.150(b) of the Illinois Administrative Code specifies that the licensed site shall be

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decontaminated to the following limits prior to termination of the license:

"Concentrations of radionuclides in soil above background concentrations for total radium, averaged over areas 100 square meters, shall not exceed:

- A) 5 picocuries per gram of dry soil, averaged over the first 15 centimeters below the surface; and
- B) 15 picocuries per gram of dry soil, averaged over layers of 15 centimeters thickness more than 15 centimeters below the surface."

The State requirements in Section 332.150(b) of the Illinois Administrative Code were based on the federal standards in 40 CFR 192.12(a). When the federal standards in 40 CFR 192 were developed over a decade ago, the 5 picocuries per gram (pCi/g) standard was a health based standard, but the 15 pCi/g standard for subsurface soil was technology based, reflecting instrument limitations in locating subsurface deposits. The 15 pCi/g limit is not a health-based standard, and should not be applied to situations in which a health-based standard is appropriate, or to situations that differ substantively from those for which it was derived.

The 15 pCi/g limit was developed as a practical measurement tool for use in locating discrete caches of high activity tailings (typically 300-1000 pCi/g) that were deposited in subsurface locations at mill sites or at nearby properties. The subsurface soil standard in 40 CFR 192 was originally proposed as 5 pCi/g. The final standard was changed, not because the health basis was relaxed, but rather in order to reduce the cost to DOE of locating buried tailings - under the assumption that this would result in essentially the same degree of cleanup at the DOE sites as originally proposed under the 5 pCi/g criterion. The use of a 15 pCi/g subsurface criterion allowed the DOE to use field measurements rather than laboratory analysis to determine when buried tailings had been detected. It is only appropriate for use as a cost-effective tool to locate radioactive waste in situations where contaminated subsurface materials are of high activity and are not expected to be significantly admixed with clean soil. The 15 pCi/g subsurface criterion was not developed for situations where significant quantities of moderate or low activity materials are involved, such as at the Residential Areas site. Therefore, the 15 pCi/g subsurface criterion is not appropriate for use at the Residential Areas site, and thus is not an ARAR. The 5 pCi/g standard, on the other hand, was developed as a health-based standard and is appropriate for use at the Residential Areas site.

Although the soil concentration standard in the regulation is written in terms of an average over an area of 100 square meters, areal averaging will not be conducted during discovery and characterization. This approach is conservative and should minimize the chances of not identifying contamination during the discovery and characterization surveys.

Therefore,

The Discovery and Characterization Criterion for outdoor soil concentrations will be exceedance of 5 picocuries per gram total radium (radium-226 plus radium-228), dry soil, above background in any 15 centimeter depth based upon Section 332.150(b) of the Illinois Administrative Code.

• Outdoor Gamma Exposure Rates

Section 332.150(b) (2) of the Illinois Administrative Code, "Termination of Source Material Milling Facility License," deals with a site licensed by IDHS that is to be decontaminated for license termination. It states that the licensed site shall be decontaminated to the following limits prior to termination of the license:

"The level of gamma radiation measured at a distance of 100 centimeters from the surface shall not exceed background."

This regulation applies only to a licensed site, but the requirements are relevant to the Residential Areas since the intent of the standards is to limit public exposure from site-related radioactive materials.

The variability and distribution of naturally-occurring radioactive materials results in a range of normal background levels, even within a small region such as a few mile radius around West Chicago. In part, this originates from variable geological constituents and in part from human actions (such as phosphate fertilization which can add additional radium to the soil). Consequently, there is not a single number that can be said to be "background" for the entire West Chicago region. While not represented by a single number, the normal background levels of gamma exposure rate will fall within a range and in a fairly predictable statistical pattern. Consequently, a statistical method will be applied to both establish background and what is distinctly above background.

Because there are sources unrelated to thorium mill tailings (such as phosphate fertilizers) that could cause elevated gamma readings at the Residential Areas, it is not appropriate to use the background gamma standard during the discovery phase as a strict, single criterion that, in and of itself, triggers cleanup. However, U.S. EPA will use measurements of outdoor gamma exposure rate as a "finding tool" to locate those areas that are statistically distinct from background. Gamma readings found to be statistically distinct from background at a property will be an indication of possible thorium mill tailings contamination. Such areas will, at a minimum, be investigated further. Elevated gamma readings alone generally will not trigger a cleanup action unless combined with soil sampling data that exceeds the soil concentration criterion and confirms the presence of thorium mill tailings.

Because the background gamma standard will be used extensively as a "finding tool" and not as a strict criterion, exposure rates may be measured at varying heights from the ground surface (typically, 0 to 1 meter), depending on detection sensitivities, practicality, and other conditions encountered in the field.

Therefore,

The Discovery and Characterization Criterion for outdoor gamma exposure rate will be the statistical exceedance of background based upon the Illinois Administrative Code, Section 332.150 (b) (2).

• Indoor Gamma Exposure Rates

The only promulgated standard that specifically deals with indoor gamma exposure rate is 40 CFR 192.12(b) (2), which states that the objective of remedial action shall be that

"In any occupied or habitable building--...The level of gamma radiation shall not exceed the background level by more than 20 microrentgens per hour."

Gamma ray exposure to 20 microrentgens per hour for a substantial portion of the year could result in an annual dose exceeding 100 millirem, due solely to external exposure to gamma rays. Recommendations by eminent bodies of radiation scientists, and regulations and policies of federal agencies such as the Nuclear Regulatory Commission and the Department of Energy, are to limit doses to members of the general public to less than 100 millirem per year, including both external exposure (from gamma rays) and internal exposure (from inhalation and ingestion). In addition, NRC's regulations at 10 CFR 20, DOE Order 5400.5 and NRC Regulatory Guide 8.37 contain an "ALARA" (As Low As Reasonably Achievable) approach, which sets forth an objective to attain dose levels as far below the dose limits as practicable. Moreover, EPA believes that individual sources of contamination should be kept to a small fraction of the primary limit of 100 millirem per year, and generally sets annual dose standards below a couple of tens of millirems.

As a result of the above considerations, 40 CFR 192.12(b) (2) is not appropriate for use at the Residential Areas site, and thus is not an ARAR.

Although meant to apply to outdoor situations, the gamma exposure rate standard found at Section 332.150 (b) (2) of the Illinois Administrative Code is a TBC for indoor gamma exposure rate, since the intent is to limit public exposure to site-related radioactive materials, and since periods of occupancy are higher indoors than outdoors.

As with outdoor gamma exposure rate, normal background values for indoor gamma exposure rate will fall within a range and in a fairly predictable statistical pattern; background is not a single value and must be treated statistically. In addition, different building materials (such as bricks, concrete blocks and granite hearths) that contain naturally occurring radiological materials could cause elevated indoor gamma readings that are unrelated to thorium mill tailings. For these reasons, U.S. EPA will use measurements of indoor gamma exposure rate as a "finding tool" to locate contaminated areas that may be below or alongside the foundations of buildings. Elevated indoor gamma readings alone generally will not trigger a cleanup action unless combined with soil sampling data that exceeds the soil concentration criterion and confirms the presence of thorium mill tailings.

Therefore,

The Discovery and Characterization Criterion for indoor gamma exposure rate will be the statistical exceedance of background, based upon the Illinois Administrative Code, Section 332.150(b) (2).

As with outdoor gamma exposure rate, a statistical method will be applied to both establish background and what is distinctly above background.

• Indoor Radon/Thoron Decay Product Concentrations

Standards dealing with indoor radon decay product concentrations are found at 40 CFR 192.12(b) (1), which states that:

"In any occupied or habitable building-- The objective of remedial action shall be, and reasonable effort shall be made to achieve, an annual average (or equivalent) radon decay product concentration (including background) not to exceed 0.02 WL. In any case, the radon decay product concentration (including background) shall not exceed 0.03 WL..." (WL, or working levels, is a measure of the concentration of radon decay products.)

While radon-222 (commonly known just as radon) is produced from the Uranium Decay Series, radon-220 (commonly known as thoron) is the Thorium Decay Series form of radon. 40 CFR 192.40(b) states that the provisions of the standard applicable to radon also apply to thoron. U.S. EPA interprets the radon decay product concentration of 0.02 WL at 40 CFR 192.12(b) (1) to represent the combined (total) concentration of decay products from both radon and thoron.

In the absence of the thorium mill tailings, naturally-occurring decay product concentrations consist primarily of radon, with thoron decay product levels at about 25% to 50% of those of radon. However, since the thorium decay series radionuclides dominated in the ores used at the factory site, it is reasonable to assume that contaminated properties may show elevated levels of thoron if tailings are located below or

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alongside the foundation of a building. However, because of different half lives in the thoron decay series, and depending on the location of the tailings, not every contaminated property will show elevated levels of thoron.

Due to the need for expeditious surveillance, measurements during the discovery and characterization phases will occur over a shorter time frame than the annual average (or equivalent) associated with the wording of the relevant and appropriate requirement. In order to not unduly delay assessments, discovery and characterization measurement periods may be on the order of 2 days to 3 months. Since weather, seasons and home usage all influence indoor radon/thoron levels, these shorter measurements may not fully characterize the annual average but should be adequate to serve as "finding tools."

As with outdoor and indoor gamma exposure rate, there is a natural variability in the range of indoor radon/thoron decay product concentrations. Some areas of West Chicago, as in other parts of the country, may have naturally high levels of indoor radon that are totally unrelated to thorium mill tailings. For these reasons, U.S. EPA will use measurements of indoor radon/thoron decay product concentrations as a "finding tool" to help locate contaminated areas that may be below or alongside the foundations of buildings. Elevated indoor radon/thoron decay product readings alone will not trigger a cleanup action unless combined with soil sampling data that exceeds the soil concentration criterion and confirms the presence of thorium mill tailings.

Therefore,

The Discovery and Characterization Criterion for indoor radon/thoron decay product concentrations is 0.02 WL combined radon and thoron decay products (including background) based upon 40 CFR 192.12 (b) (1).

If a property exceeds this criterion due to naturally-occurring radon, and there is no other indication of thorium mill tailings on the property, the property will not be remediated as part of this Superfund action.

• "As Low As Reasonably Achievable" (ALARA)

As discussed above, NRC's regulations at 10 CFR 20, DOE Order 5400.5 and NRC Regulatory Guide 8.37 all contain an ALARA approach which sets forth the objective to attain dose levels as far below the dose limits as practicable. These requirements are TBCs for the removal actions at the Residential Areas.

In addition, Section 340.1000(b) of the Illinois Administrative Code is a TBC for the removal actions at the Residential Areas. Section 340.1000(b), which applies to "licensees and registrants," states,

"In addition to complying with the requirements set forth in this Part, every reasonable effort should be made to maintain radiation exposures, and releases of radioactive materials in effluents to unrestricted areas, as low as is reasonably achievable. The term 'as low as is reasonably achievable' means as low as is reasonably achievable taking into account the state of technology, and the economics of improvements in relation to benefits to the public health and safety, and other societal and socioeconomic considerations, and in relation to the utilization of ionizing radiation in the public interest."

The NRC regulations at 10 CFR 20 contain similar language.

As a result, during discovery and characterization, the following ALARA approach will be used for the Residential Areas site:

Every reasonable effort should be made to maintain radiation exposures, and the amount of radioactive materials in unrestricted areas, to levels that are as low as is reasonably achievable.

VERIFICATION PHASE

Once a property has been designated for a removal action, the success of the operation must be verified during and at the completion of the removal action. During the verification phase, properties will be surveyed and sampled to ensure that cleanup to levels protective of human health and the environment has been achieved.

As indicated below, some of the verification criteria will be applied during and immediately following the removal action, with surveys and samples collected before the open excavation is backfilled with clean material. Some of the verification criteria will be applied later, with surveys and samples collected after the excavation is backfilled.

The criteria to be used during the verification phase are as follows:

- Outdoor Soil Concentrations

The Verification Criterion for this parameter will be soil concentrations that do not exceed 5 picocuries per gram total radium (radium-226 plus radium-228), dry soil, above background, averaged over areas up to 100 square meters, in any 15 centimeter depth based upon Section 332.150(b) of the Illinois Administrative Code.

Samples for outdoor soil concentrations will be collected before backfilling.

- Outdoor Gamma Exposure Rates

During cleanup of a property, as during the discovery and characterization phases, outdoor gamma exposure rates will be used as a "finding tool" to help determine where additional excavation may be needed. The main criterion to determine when excavation can cease, however, is the outdoor soil concentration criterion.

However, Section 332.150(b) (2) of the Illinois Administrative Code (which requires that, prior to termination of the license, the licensed site be decontaminated so that "The level of gamma radiation measured at a distance of 100 centimeters from the surface shall not exceed background") is relevant to the Residential Areas, and is appropriate for application at the completion of a cleanup action at a property.

Therefore,

The Verification Criterion for this parameter will be outdoor gamma exposure rates that do not statistically exceed background at a distance of 100 centimeters from the surface, based upon the Illinois Administrative Code, Section 332.150(b) (2).

Outdoor gamma exposure rate surveys to verify that this criterion has been met will be conducted after backfilling. A statistical method will be applied to both establish background and what is distinctly above background.

- Indoor Gamma Exposure Rates

For properties that require cleanup and that were found, during discovery and characterization, to have elevated levels of indoor gamma exposure rate due to thorium mill tailings contamination on the property, indoor gamma exposure rate surveys will be used during the cleanup action as a "finding tool" to help determine if additional excavation is necessary.

The Verification Criterion for this parameter will be indoor gamma exposure rates that do not statistically exceed background based upon the Illinois Administrative Code, Section 332.170(c).

For properties that require cleanup, but for which no elevated indoor gamma readings were found during discovery and characterization, indoor gamma surveys will not be conducted during the verification phase.

- Indoor Radon/Thoron Decay Product Concentrations

For properties that require cleanup and that were found, during discovery and characterization, to have elevated levels of indoor radon/thoron decay product concentrations due to thorium mill tailings contamination on the property, additional surveys will be conducted at the completion of the cleanup action to determine if the following verification criterion has been met:

In any occupied or habitable building, the objective of remedial action shall be, and reasonable effort shall be made to achieve, an annual average (or equivalent) combined radon and thoron decay product concentration (including background) not to exceed 0.02 WL. In any case, the combined radon and thoron decay product concentration (including background) shall not exceed 0.03 WL. (Based on 40 CFR 192.12(b) (1).)

For properties that require cleanup, but for which no elevated indoor radon/thoron decay product concentrations due to thorium mill tailings were found during discovery and characterization, indoor radon/thoron testing will not be required during the verification phase.

• "As Low As Reasonably Achievable" (ALARA)

In addition to meeting the verification criteria described above, the following ALARA approach will be used during cleanup actions:

Every reasonable effort should be made to maintain radiation exposures, and the amount of radioactive materials in unrestricted areas, to levels that are as low as is reasonably achievable.

RELEASE CRITERIA

In addition to the above criteria for discovery, characterization and verification, it will be necessary throughout the project to release equipment from work sites and it may be necessary to assess whether materials or surfaces are suitable for unrestricted use. Requirements for such situations are found in the Illinois Administrative Code, Section 340, Appendix C(a); these requirements are relevant and appropriate for use at the Residential Areas. Similar requirements also are found in the U.S. Nuclear Regulatory Commission's Regulatory Guide 1.86, Table 1; these guidelines are not ARARs (since only promulgated regulations can be ARARs), but the U.S. EPA does consider them to be TBCs.

Both sets of requirements are shown below. Since the requirements are set up with differing units, the most restrictive part for a given situation would be used.

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- Illinois Administrative Code, Section 340, Appendix C(a)

DECONTAMINATION GUIDES

a) Surface Contamination Guide

Alpha Emitters

Removable	15 33	pCi per 100 cm ² = dpm per 100 cm ²	average over any one surface
	45 100	pCi per 100 cm ² = dpm per 100 cm ²	maximum
Total (fixed)	450 1,000	pCi per 100 cm ² = dpm per 100 cm ²	average over any one surface
	2,250 5,000	pCi per 100 cm ² dpm per 100 cm ²	maximum
	0.25 mRem per hour at 1 cm		

Beta-Gamma Emitters

Removable (all beta-gamma emitters except Hydrogen 3)	100 500	pCi per 100 cm ² pCi per 100 cm ²	average over any one surface maximum
Removable (Hydrogen 3)	1,000 5,000	pCi per 100 cm ² pCi per 100 cm ²	average over any one surface maximum
Total (fixed)	0.25 mRem per hour at 1 cm from surface		

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• U.S. Nuclear Regulatory Commission, Regulatory Guide 1.86, Table 1

TABLE 1

ACCEPTABLE SURFACE CONTAMINATION LEVELS

NUCLIDE ^a	AVERAGE ^b	MAXIMUM ^b	REMOVABLE ^c
U-nat, U-235, U-238, and associated decay products	5,000 dpm α per 100 cm ²	15,000 dpm α per 100 cm ²	1,000 dpm α per 100 cm ²
Transuranics, Ra-226, Ra-228, Th-230, Th-228, Pa-231, Ac-227, I-125, I-129	100 dpm per 100 cm ²	300 dpm per 100 cm ²	20 dpm per 100 cm ²
Th-nat, Th-232, Sr-90, Ra-223, Ra-224, U-232, I-126, I-131, I-133	1000 dpm per 100 cm ²	3000 dpm per 100 cm ²	200 dpm per 100 cm ²
Beta-gamma emitters (nuclides with decay modes other than alpha emission or spontaneous fission) except Sr-90 and others noted above.	5000 dpm β - γ per 100 cm ²	15,000 dpm β - γ per 100 cm ²	1000 dpm β - γ per 100 cm ²

^a Where surface contamination by both alpha- and beta-gamma-emitting nuclides exists, the limits established for alpha- and beta-gamma-emitting nuclides should apply independently.

^b As used in this table, dpm (disintegrations per minute) means the rate of emission by radioactive material as determined by correcting the counts per minute observed by an appropriate detector for background, efficiency, and geometric factors associated with the instrumentation.

^c Measurements of average contaminant should not be averaged over more than 1 square meter. For objects of less surface area, the average should be derived for each such object.

^d The maximum contamination level applies to an area of not more than 100 cm².

^e The amount of removable radioactive material per 100 cm² of surface area should be determined by wiping that area with dry filter or soft absorbent paper, applying moderate pressure, and assessing the amount of radioactive material on the wipe with an appropriate instrument of known efficiency. When removable contamination on objects of less surface area is determined, the pertinent levels should be reduced proportionally and the entire surface should be wiped.

Criteria Not Chosen for Discovery, Characterization or Verification

Discussed below are other parameters and their associated regulations and standards that were reviewed by U.S. EPA to determine whether they were ARARs and should be used as discovery, characterization and/or verification criteria. None of these standards is applicable to the removal action and, as explained below, none is relevant and appropriate.

• Outdoor Radon Concentrations

Outdoor radon (radon-222) and thoron (radon-220) are regulated in Section 332.170(b) of the Illinois Administrative Code:

"During the operating life and facility decommissioning, the combined concentration of radon and thoron at the boundary of the licensed site, measured at a height of one meter from the surface, averaged annually, shall not exceed three picocuries per liter above the background concentration at the licensed site."

Even though on its terms the regulation applies only to a licensed facility, the intent of the regulation is to control radon and thoron in off-site areas, since the point of compliance is at the boundary of the licensed site. Therefore, the U.S. EPA considers the regulation to be relevant to the Residential Areas.

However, there are practical reasons why measurements for radon and thoron outdoors will not aid in the identification of contaminated properties not otherwise identified by outdoor gamma exposure rate surveys and outdoor soil concentration samples. These reasons are as follows: (1) Reliable radon and thoron measurements are not immediate, but can take days or weeks to measure good averages. Gamma surveys, on the other hand, can provide instantaneous measurements; (2) Unless the emissions are extremely large, radon and thoron emitted from the ground surface will rapidly mix in the open air, making them indistinguishable from naturally occurring radon and thoron. Large radon and thoron emissions would be associated with large contaminant deposits easily identifiable by gamma survey instruments; (3) Because radon and thoron are gases that can be transported by the wind, it would be much harder to pinpoint the emission site.

Therefore, for the reasons stated above, outdoor radon concentrations (radon and thoron), though relevant, are not appropriate to these circumstances and will not be one of the criteria for this response action.

• Radon Release Rates from Soil

The emission of radon (radon-222) and thoron (radon-220) from soils is regulated in Section 332.170(c) of the Illinois Administrative Code, which states:

"The disposal area shall be designed so that after reclamation and stabilization, the annual total radon release rate through the cover from the byproduct material shall not exceed two picocuries per square meter per second."

This regulation only applies to the disposal area at a licensed facility, but the intent of the regulation is to control the total radon emission to the environment and to protect the general population.

However, Section 332.240(a) of the Illinois Administrative Code states:

"Monitoring for total radon after installation of an appropriately designed cover is not required. Total radon emissions from cover material shall be estimated as part of developing a closure plan."

Since it appears that the State never intended that actual measurements be made to show compliance with the regulation, the U.S. EPA does not consider this regulation to be relevant and appropriate for use at the Residential Areas. In addition, there are other, practical reasons why measurements of radon and thoron emissions from soil would not be an appropriate indicator of contaminants. At the Residential Areas, thoron is the dominant radon isotope of concern. If thoron is produced at a depth of more than a few inches below the ground surface, it will radioactively decay to a solid element and cease moving through the soil before reaching the surface. Soil sampling, on the other hand, will find contaminants at much greater depth, as would gamma exposure rate measurements which penetrate soil depths on the order of several feet.

Consequently, measurements for radon and thoron emission rates will not be conducted during this response action.

• Doses in the General Environment

Thorium-related doses in the general environment are regulated in 40 CFR 192.41(d), which states:

"Operations...shall be conducted in such a manner as to provide reasonable assurance that the annual dose equivalent does not exceed 25 millirems to the whole body, 75 millirems to the thyroid, and 25 millirems to any other organ of any member of the public as a result of exposures to the planned discharge of radioactive materials, radon-220 and its daughters excepted, to the general environment."

Doses in the general environment also are regulated in Section 332.170(a) of the Illinois Administrative Code, which states:

"At all times, concentrations of radioactive material, excluding radon, thoron, and their progeny, which may be released to the general environment in groundwater, surface water, air, soil, or other means shall not result in a committed effective dose in excess of 25 millirem (0.25 mSv) to the whole body, and a

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committed dose equivalent in excess of 75 millirem (0.75 mSv) to the thyroid, and 25 millirem (0.25 mSv) to any other organ of any member of the public."

* mSv designates milliSieverts, a dose unit equal to 100 millirem.

Neither of the above regulations is applicable to the Residential Areas, but the U.S. EPA considers both to be relevant.

Even though the dose requirements of 40 CFR 192.41(d) and Section 332.170(a) of the Illinois Administrative Code are relevant to the Residential Areas, there are practical reasons why performing dose assessment calculations will not aid in the identification of contaminated properties not otherwise detected by the other discovery criteria. An operational assumption for this response action is that where site parameters such as indoor or outdoor gamma exposure rate, outdoor soil concentrations, or indoor radon and thoron are elevated, dose is elevated proportionally. Therefore, having specific dose calculations is not appropriate as it will not provide useful information not already provided by other parameters. Consequently, no separate dose assessment calculations will be required for this response action.